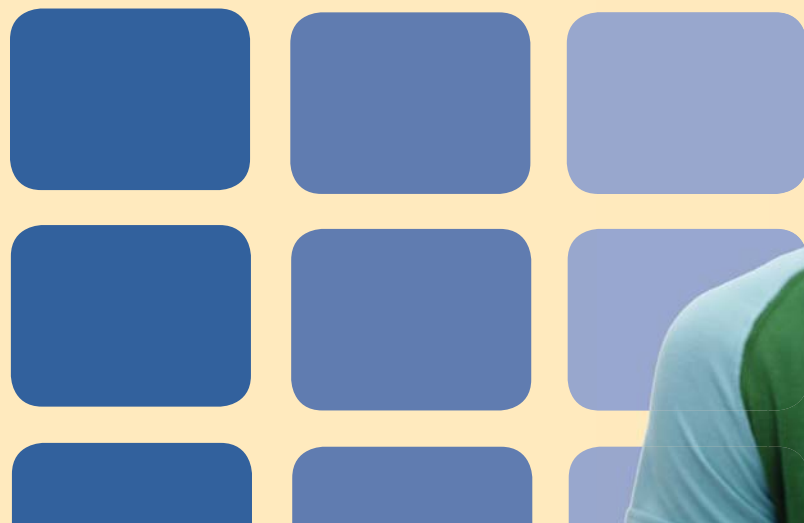


State of Asthma in Missouri

BRFSS Asthma Call-back Study

2006-2008



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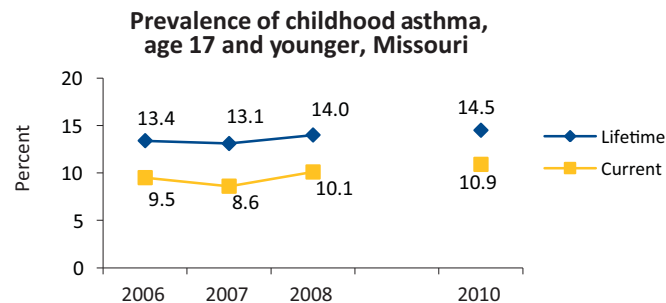
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Asthma is a chronic respiratory condition affecting thousands of children and adults in Missouri. In 2010, more than 400,000 adults (8.8%) and 155,000 children (10.9%) were living with the condition.^{1,2} Among adults, the prevalence is up from 7.2 percent in 2000 and it is also on the rise among children. Women (10.9%) have a higher prevalence than men (6.6%). However, among children age 17 and younger males (12.0%) have a higher prevalence than females (10.0%).



People with asthma experience inflammation and swelling of the airways leading to episodes of coughing, wheezing, chest tightness and mild to severe respiratory distress. Uncontrolled asthma has a deleterious impact on quality of life and leads to increased health care utilization and costs.

While the exact cause of asthma is unknown, many exacerbations and deaths are preventable. To gain and maintain asthma control requires ongoing compliant care with the *Expert Panel Report 3 (EPR-3): Guidelines for the Diagnosis and Management of Asthma*.³ Essential asthma control and management components include assessment and monitoring, education for self-management, control of environmental factors and co-morbid conditions, and appropriate pharmacologic therapy.

This report provides baseline information that describes the state of asthma control and management in Missouri using the adult and child Missouri Asthma Call-Back Surveys (ACBS), 2006-2008. These surveys are conducted in conjunction with the Behavioral Risk Factor Surveillance System (BRFSS).^{4,5}

The BRFSS is a cross-sectional telephone survey that generates U.S. and state-specific information about health risk behaviors, clinical preventive services, disease prevalence, health care access and other health-related issues.⁴ BRFSS data are collected through random-digit dialed (RDD) monthly telephone interviews with non-institutionalized, civilian, adults (18 years of age and older) using a standardized protocol and is supported by the Centers for Disease Control and Prevention. Data regarding children age 17 and younger are collected from a parent or guardian. Respondents who answer “yes” to questions about current or lifetime asthma during the BRFSS interview are asked if they would be willing to be called back for a more in-depth interview regarding their or their child’s asthma. If consent is given, the person is re-contacted and the adult or child ACBS interview is conducted. Table 1 shows the ACBS Missouri response rates and combined state medians.⁵

Table 1. Asthma Call-Back Surveys Missouri Response Rates and U.S. Medians

Year	Missouri		U.S.	
	Response Rate (%)		Median	
	Adult	Child	Adult	Child
2006	58.5	50.2	53.1	51.4
2007	54.4	49.6	54.3	51.5
2008	53.5	60.0	50.6	49.1

A total of 1,004 adult and 262 child Missouri ACBSs were completed during the three-year period (Table 2). Detailed demographic tables are included in the Appendix.

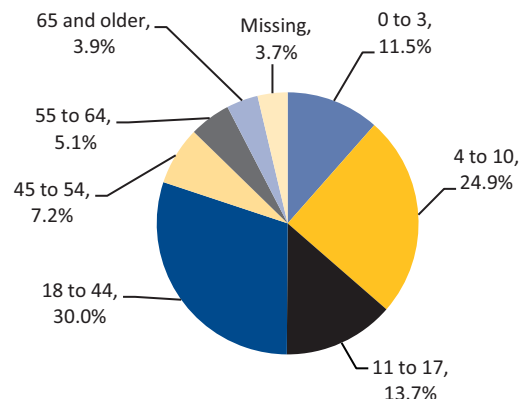
Table 2. Missouri Asthma Call-Back Survey Sample Sizes

Year	Adult	Child
2006	362	97
2007	313	80
2008	329	85
Total	1,004	262

Recent History—Adults

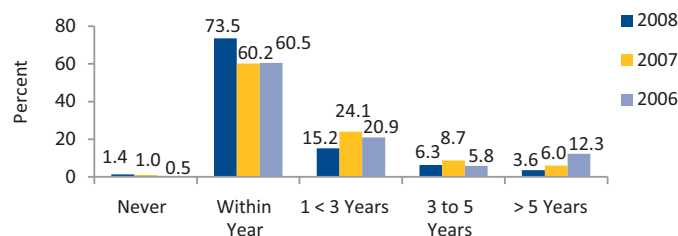
The first component of asthma care by EPR-3 guidelines is assessment and monitoring. This includes patient history, routine health care, symptoms, spirometry, functional impairments and future risks of adverse events. This is an essential component of asthma management based on the EPR-3 guidelines. For adults, there is some evidence of progressively declining lung function from asthma in addition to normal aging which may be minimized if treatment is initiated soon after diagnosis. A large proportion of adults in Missouri were diagnosed 18 to 44 years of age (30.0%) with 11.5 percent diagnosed prior to age 3 (Figure 1).

Figure 1. Age at diagnosis among adults with current and former asthma, Missouri, 2006-2008



Monitoring asthma over time allows the health care provider to assess the varying intensity of the disease, responsiveness to treatment and determine health outcomes. The majority of Missouri adults with asthma have spoken with a doctor or other health professional within the past year about their asthma.

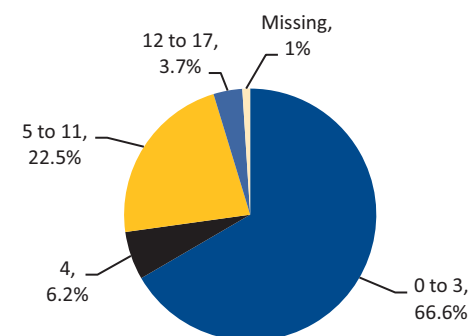
Figure 2. Time since adults last talked to a doctor or other health professional about their asthma by year, Missouri, 2006-2008



Recent History—Children

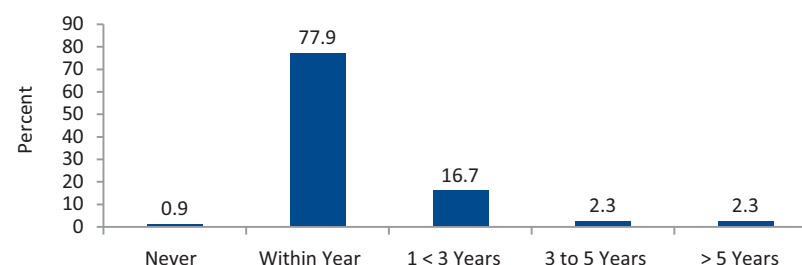
The course or the natural history of asthma may vary markedly from person-to-person. However, the individual's age at the time of asthma onset influences declines in lung function growth. Many children whose asthma symptoms begin before age 3 experience significant deficits in lung function by age 6 and are at risk of developing persistent asthma. A portion of children diagnosed after age 3 will also have declining lung function as they age. Two out of three Missouri children with asthma (66.6%) were diagnosed at or before age 3 and are at risk of declining lung function (Figure 3).

Figure 3. Age at diagnosis among children with current and former asthma, Missouri, 2006-2008



Children must receive regular ongoing care for the management and control of asthma. Three of every four parents (77.9%) have spoken with a health professional within the past year about their child's asthma (Figure 4).

Figure 4. Time since parent talked to a health professional about child's asthma, Missouri, 2006-2008



Asthma Symptoms—Adults

The goal of treating asthma is to alleviate symptoms, improve quality of life and maintain lung function. Assessing asthma severity and control are defined in terms of impairment and risk. Impairment is the frequency and intensity of symptoms and functional limitations the person with asthma is experiencing. Risk is the likelihood of either an asthma attack, progressive loss of lung function or adverse effects from medication.

In Missouri, the majority of adults with current asthma had their last asthma symptoms within the past week prior to the survey (Figure 5). Many adults with asthma experience symptoms most of the month and some have symptoms every day (Figure 6). Of the adults who experience symptoms every day, more than one-half (53.0%) have asthma symptoms throughout the day (Figure 7).

Figure 5. Last time had symptoms among adults with current asthma by year, Missouri, 2006-2008

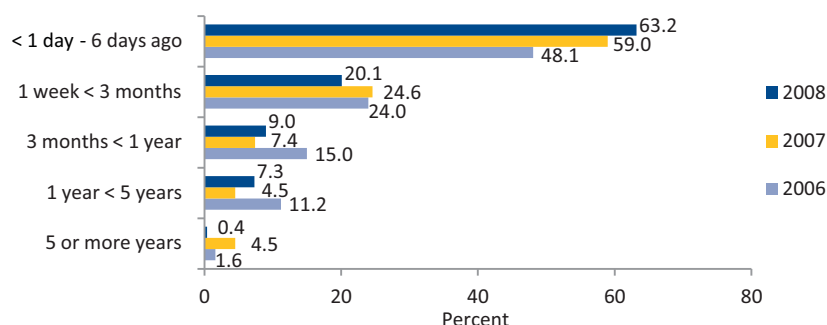


Figure 6. Number of days asthma symptoms experienced in past 30 days among adults with current asthma

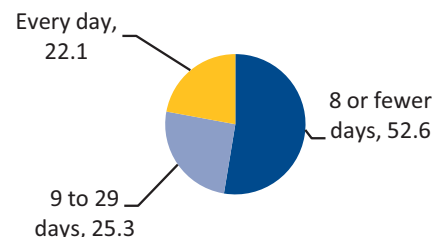
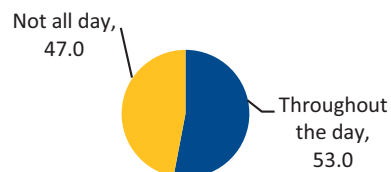


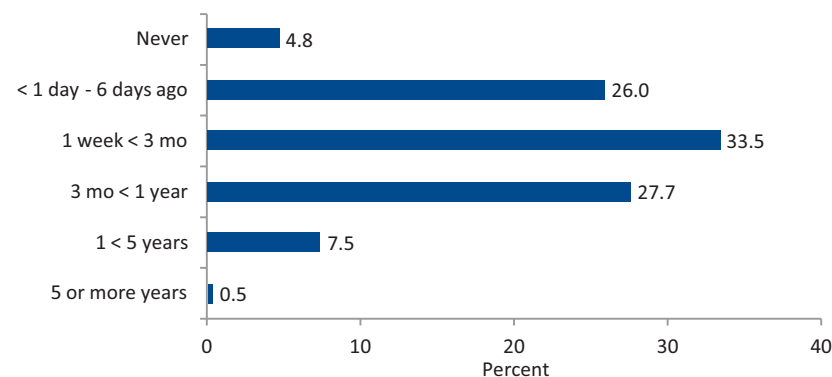
Figure 7. Percent with symptoms throughout the day among those adults with asthma symptoms every day, Missouri, 2006-2008



Asthma Symptoms—Children

Many children with asthma are unable to run and play or participate in their usual activities. The majority of children with current asthma in Missouri experienced symptoms within the three months prior to the survey (Figure 8).

Figure 8. Last time had symptoms among children with current asthma, Missouri, 2006-2008



About one-fifth of the children with current asthma in Missouri have symptoms nine or more days per month (Figure 9) and a smaller proportion (3.6%) compared to adults (22.1%) have symptoms every day. Of those with symptoms every day, more than one-half also have symptoms throughout the day (Figure 10).

Figure 9. Number of days asthma symptoms experienced in past 30 days among children with current asthma

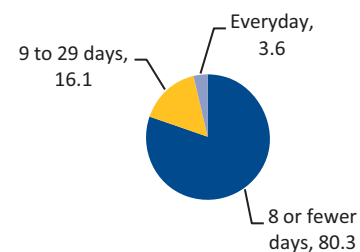
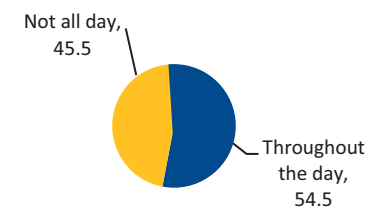


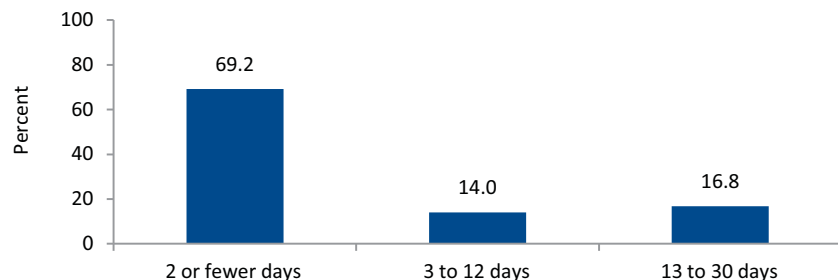
Figure 10. Percent of symptoms throughout the day among children with asthma symptoms every day



Asthma Symptoms—Adults

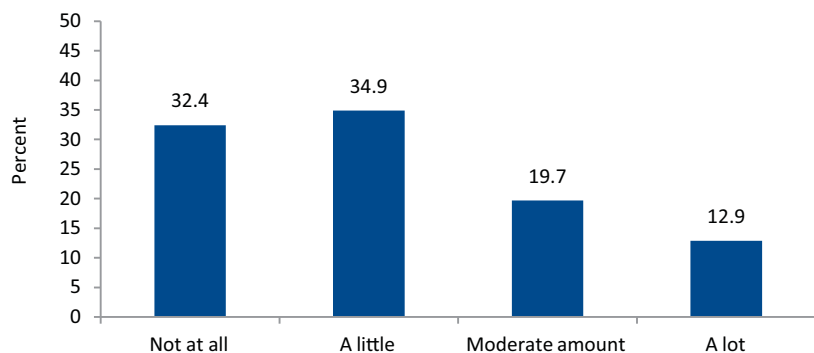
Many Missouri adults living with current asthma are unable to get a full night's rest (Figure 11).

Figure 11. Nights asthma symptoms made it difficult to stay asleep in the past 30 days among adults with current asthma, Missouri, 2006-2008



Asthma symptoms also keep many Missouri adults from their usual activities (Figure 12).

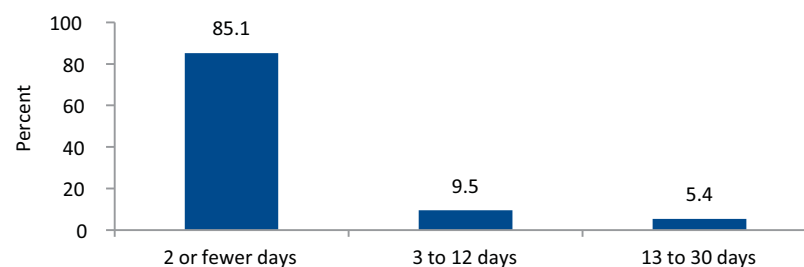
Figure 12. Prevalence of activity limitations due to asthma in past 12 months among adults with current asthma, Missouri, 2006-2008



Asthma Symptoms—Children

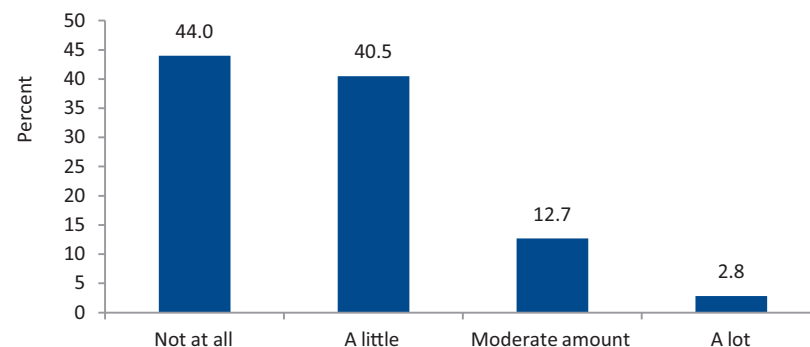
Children often are awakened during the night because of asthma symptoms (Figure 13).

Figure 13. Nights asthma symptoms made it difficult to stay asleep in the past 30 days among children with current asthma, Missouri, 2006-2008



Asthma symptoms also limit the activities of many children in Missouri (Figure 14).

Figure 14. Prevalence of activity limitations due to asthma in past 12 months among children with current asthma, Missouri, 2006-2008



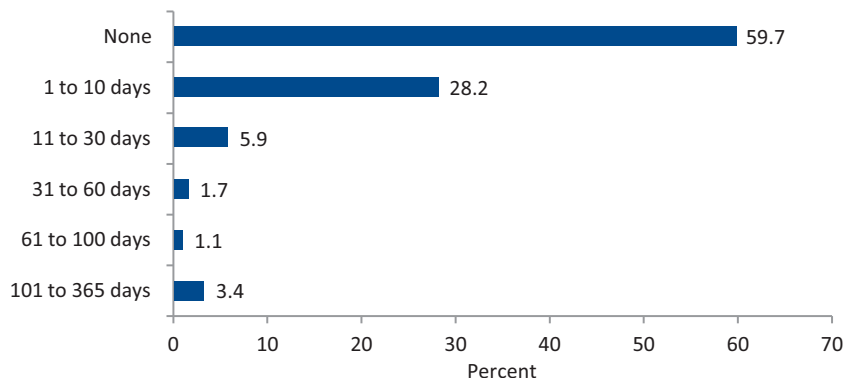
Work-Related Asthma—Adults

There are two categories of work-related asthma (WRA):

- Occupational asthma (OA) - a new case of asthma that develops following exposure to a sensitizer or irritant (e.g., chemical, allergen or other agent) in the workplace.
- Work-exacerbated asthma (WEA) - preexisting asthma or concurrent asthma (i.e., occurring at the same time from outside work exposures), that is worsened by work factors.

A large proportion of Missouri adults with current asthma were employed either full-time (43.0%) or part-time (13.6%) for the period 2006-2008. Among adults with current asthma who were employed, about one out of five (22.1%) said that their asthma was caused by their current job and one-third (35.5%) felt their asthma was made worse by their current job. Of the adults with current asthma in Missouri regardless of employment status, one out of four (25.5%) felt their asthma was caused by a previous job and 41.2 percent felt a previous job made their asthma worse. One out of five adults with current asthma (23.5%) reported changing or quitting a job because chemicals, fumes, smoke or dust made their asthma worse. More than one-fourth of adults with current asthma (28.2%) missed work or were unable to carry out their usual activities 1 to 10 days in the past 12 months (Figure 15). Overall, 4 out of 10 adults with current asthma missed at least one day of work in the past 12 months due to their asthma.

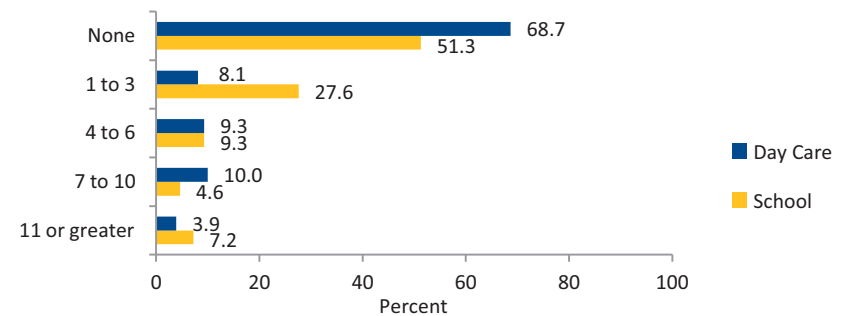
Figure 15. Number of days unable to work or carry out usual activities in the past 12 months among adults with current asthma, Missouri, 2006-2008



School-Related Asthma—Children

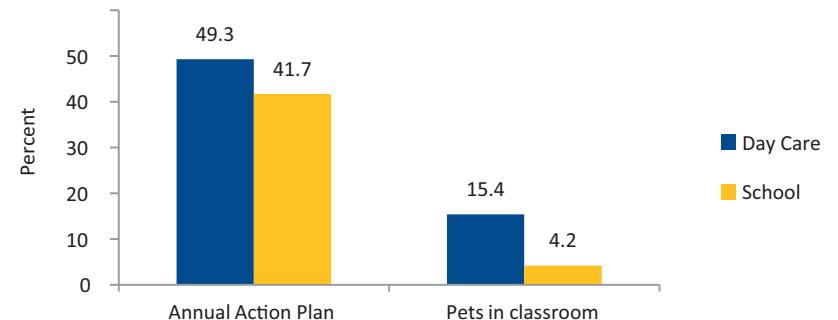
Children frequently miss school due to their asthma. This impacts their time for learning, academic achievement and performance. As shown in Figure 16, on average slightly less than one-half of school age children and one-third of preschoolers missed one or more days of day care or school due to their asthma.

Figure 16. Number of days unable to attend day care or school due to asthma among children with current asthma, Missouri, 2006-2008



On average 42.2 percent of children with current asthma, from 2006-2008, were permitted to carry their asthma medication with them while at school. Parents were asked if their child had a written asthma action plan (AAP) or asthma management plan on file at the school or day care. A greater proportion of children in day care compared to school had an AAP on file, while a greater proportion of day cares had pets in the classroom (Figure 17).

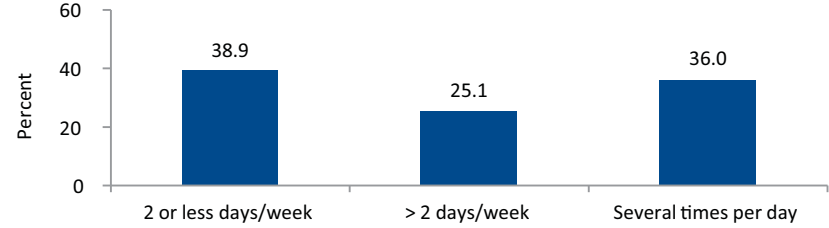
Figure 17. Prevalence of children with current asthma that have an annual action plan in school or day care and have pets in the classroom, Missouri, 2006-2008



Asthma Control—Adults

When individuals have an asthma episode or “attack,” the airways constrict making breathing difficult. A rescue medication in the form of an inhaler is critically needed, most often a short-acting beta2 agonist (SABA). The more frequent the use of a rescue medication the less a person’s asthma is controlled (Figure 18).

Figure 18. Prevalence of short-acting beta2 agonist (rescue medication) use for asthma symptoms relief among adults with current asthma, Missouri, 2006-2008



Impairment measures to assess population-based asthma control status and the asthma health status of Missouri adults are shown in Table 3.⁶ The most severe impairment in any of the three measures determines the level of control. More than one-third of Missouri adults with current asthma are very poorly controlled.

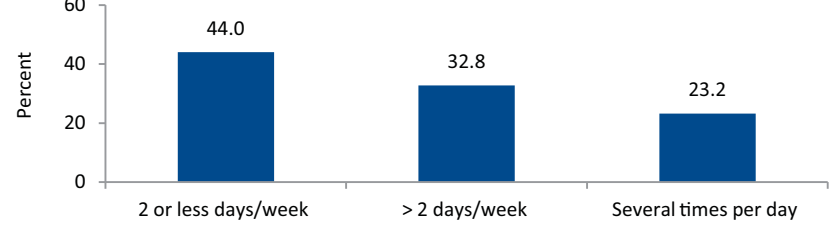
Table 3. Asthma Control Assessment Indicators and Prevalence of Control Among Adults with Current Asthma, Missouri, 2006-2008

IMPAIRMENT	Indicator	Well Controlled	Not Well Controlled	Very Poorly Controlled
	Symptoms	≤ 8 days in past 30 days	> 8 days in past 30 days but not throughout the day	Every day in past 30 days and throughout the day
	Nighttime Awakenings	≤ 2 times in past 30 days	3 to 12 times per day	13 or more days in the past 30 days
	Short-acting Beta2 Agonist Use	≤ 2 times in per week	> 2 days per week to 2 times per day	Several times per day
	Missouri Adults	35.8%	25.3%	38.9%

Asthma Control—Children

Children are especially susceptible during an asthma episode due to their small airways. Children have to be taught to recognize an impending attack, have access to their medications and learn to properly inhale their daily control and rescue inhaler medications. As in adults, the more frequent the use of a rescue medication the less a child’s asthma is controlled.

Figure 19. Prevalence of short-acting beta2 agonist (rescue medication) use for asthma symptoms relief among children with current asthma, Missouri, 2006-2008



Impairment measures to assess the asthma control status of Missouri children are shown in Table 4. About one-half of children with current asthma in Missouri are well controlled.

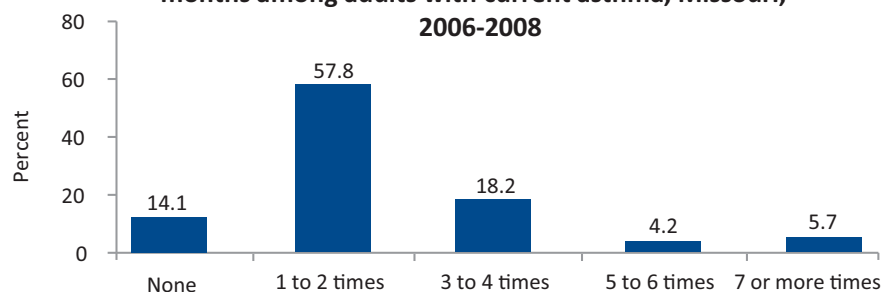
Table 4. Asthma Control Assessment Indicators and Prevalence of Control Among Children with Current Asthma, Missouri, 2006-2008

IMPAIRMENT	Indicator	Well Controlled	Not Well Controlled	Very Poorly Controlled
	Symptoms	≤ 8 days in past 30 days	> 8 days in past 30 days but not throughout the day	Every day in past 30 days and throughout the day
	Nighttime Awakenings	≤ 2 times in past 30 days	3 to 12 times per day	13 or more days in the past 30 days
	Short-acting Beta2 Agonist Use	≤ 2 times in per week	> 2 days per week to 2 times per day	Several times per day
	Missouri Children	50.8%	28.0%	21.2%

Health Care Utilization—Adults

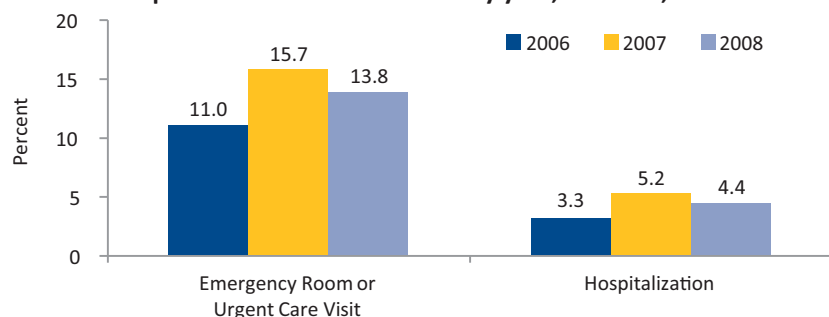
According to the EPR-3 guidelines the goal of asthma therapy is control. To achieve this goal, regular visits to a health care provider for follow-up assessments and treatment adjusted according to control status is required. In 2006-2008, about one-half of adults saw their health care provider one to two times per year for routine asthma care (Figure 20).

Figure 20. Prevalence of visiting a doctor or other health professional for routine checkup for asthma in the past 12 months among adults with current asthma, Missouri, 2006-2008



Exacerbations of asthma are episodes of progressively worsening symptoms. The more frequent and intense the exacerbations requiring an emergency room visit, urgent care or hospitalization the greater the future risk for adverse health outcomes. A substantial proportion of adults with poor asthma control experience exacerbations requiring emergency care and some inpatient hospital stays annually in Missouri (Figure 21).

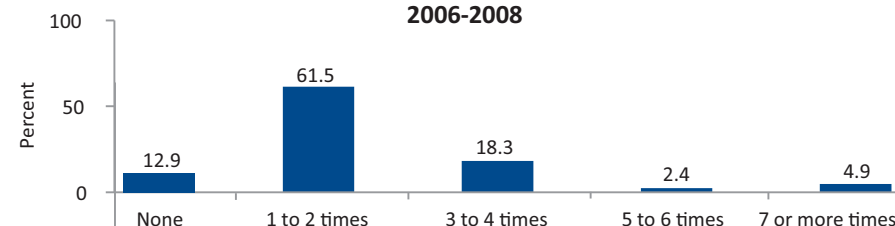
Figure 21. Prevalence of adults with current asthma that visited an emergency room or urgent care center or were hospitalized because of asthma by year, Missouri, 2006-2008



Health Care Utilization—Children

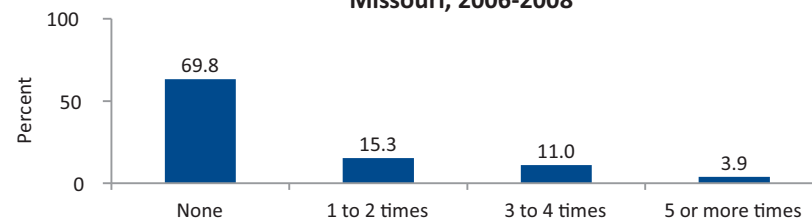
Periodic assessments (at 1- to 6-month intervals) of asthma control are recommended to determine if the goals of therapy are being met and if adjustments in therapy are needed. The majority of children with current asthma (61.5%) saw their health care professional one to two times in the past 12 months for a routine checkup of their asthma (Figure 22).

Figure 22. Prevalence of visiting a doctor or other health professional for routine checkup for asthma in the past 12 months among children with current asthma, Missouri, 2006-2008



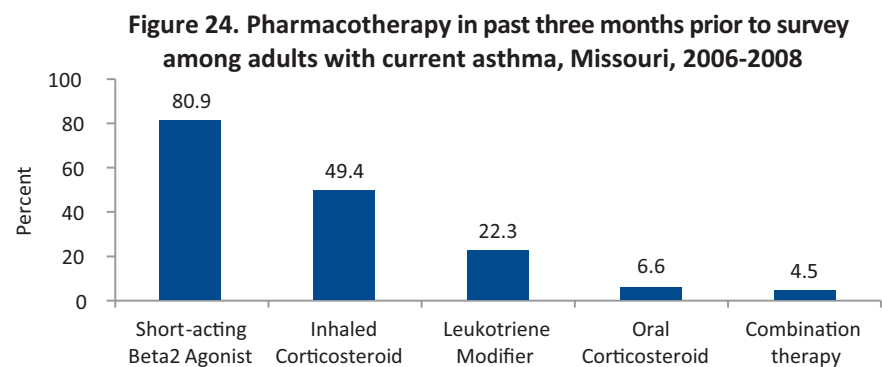
Exacerbations are characterized by decreases in expiratory airflow and may range from mild to life-threatening regardless of asthma severity. However, in general, the more frequent and intense the exacerbations requiring emergency room, unscheduled urgent care or hospitalization the greater the degree of underlying disease severity and the greater the risk for exacerbations or death. Almost one-fifth of children with current asthma (19.9%) on average visited an emergency room and 4 percent had at least one overnight hospital stay for asthma. Some children needed urgent treatment from a doctor or other health professional due to worsening symptoms or an asthma episode or attack (Figure 23).

Figure 23. Prevalence of children with current asthma who sought urgent treatment for worsening asthma in the past 12 months, Missouri, 2006-2008



Asthma Risk Assessment and Control Medication—Adults

Asthma exacerbations requiring the taking of oral corticosteroids (pills) is often called an “oral steroid burst.” Two or more oral steroid bursts per year indicate not-well/poorly controlled and persistent asthma. The frequency of oral steroid bursts indicates future risk of side effects and adverse health outcomes. Use of an inhaled corticosteroid (ICS) can drastically improve asthma control and reduce the risk of exacerbations. The asthma medication pattern among Missouri adults with asthma shows inadequate use of inhaled corticosteroids, use of costly leukotriene modifiers and combination therapy, and some taking oral steroid pills (Figure 24).

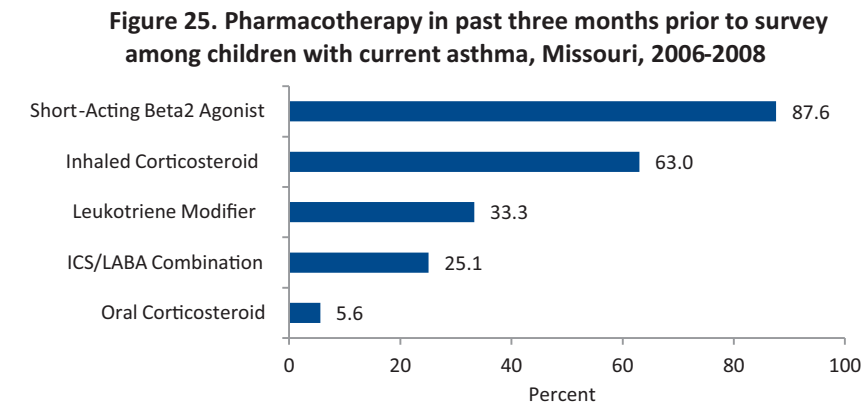


For population-based management, risk stratification is used to identify adults with asthma at increased risk of morbidity and utilization of health care resources (Table 5).

Table 5. Asthma Risk Assessment Indicators and Prevalence of at Risk by Category Among Adults with Current Asthma, Missouri, 2006-2008			
Indicator	Well Controlled	Not Well Controlled	Very Poorly Controlled
Use of Oral Steroids	Not taking 93.4%	Currently taking 6.6%	
RISK	Emergency Room Visits	0 to 1 time / year 91.7%	≥ 2 times / year 8.3%
	Urgent Care Sought from Health Provider	0 to 2 times / year 89.4%	≥3 times / year 10.6%
	Hospitalizations	0 to 1 time / year 97.6%	≥ 2 times / year 2.4%

Asthma Risk Assessment and Control Medication—Children

Pharmacologic therapy is used to prevent and control asthma symptoms, improve quality of life, reduce the frequency and severity of asthma exacerbations, and reverse airflow obstruction (Figure 25). SABA “quick relief” medications relax smooth muscles and relieve acute symptoms. ICS medications are used in the long-term control of asthma as they reduce airway hyperresponsiveness and are the most potent and effective anti-inflammatory medication currently available. Leukotriene modifiers are an alternative, but not preferred therapy for the treatment of mild persistent asthma.



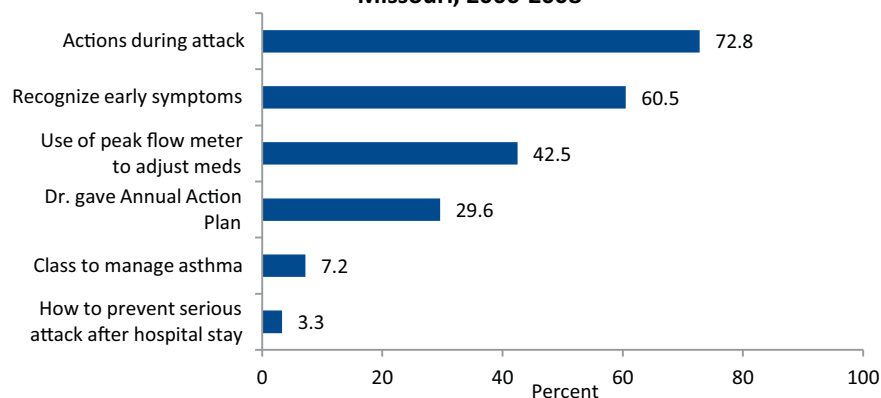
Long-acting Beta2 Agonists (LABAs) are used in combination with ICSs for long-term control in moderate or severe persistent asthma. Oral systemic corticosteroids suppress, control, and reverse airway inflammation and are used for moderate and severe exacerbations as adjunct to SABAs to speed recovery and prevent recurrence of exacerbations. However, side effects with chronic administration of oral steroids include adrenal suppression, growth suppression, skin thinning, central obesity, immune suppression, hypertension, Cushing’s syndrome (excess cortisol), cataracts, and muscle weakness. Many children living with asthma in Missouri are at risk of future exacerbations and repeated use of oral steroids based on risk indicators:

- 5.6 percent took oral steroids within 3 months before survey
- 13.2 percent visited an ER or sought urgent care two or more times in past 12 months
- 4.0 percent were hospitalized one to two times in the past 12 months

Knowledge of Asthma/Management Plan—Adults

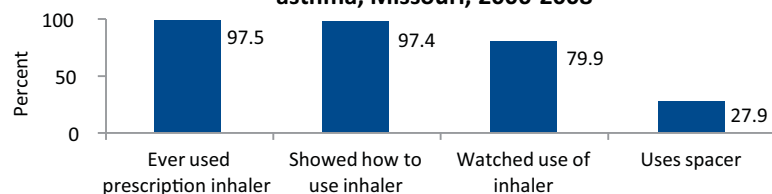
Reaching asthma control involves a great deal of self or care giver management. It is imperative that the patient or care giver receive education to have an understanding and the skills to achieve the outcomes of impairment and lower health care utilization and cost. As shown in Figure 26, the majority of adults with current asthma have received education on what to do during an asthma attack (72.8%) and on the early recognition of the signs and symptoms of an attack (60.5%). Yet, on average only 7.2 percent of Missouri adults with current asthma have taken a course or class on how to manage their asthma. Only 3.3 percent of adults were talked to about preventing a serious asthma attack by a health professional the last time they left the hospital.

Figure 26. Asthma education among adults with current asthma, Missouri, 2006-2008



A critical component of education is teaching and assessing inhalation technique or how a person breathes in their medication to assure lung deposition. Most adults with asthma have used an inhaler but less than one-third use a spacer (Figure 27). However, these are not measures of inhalation technique.

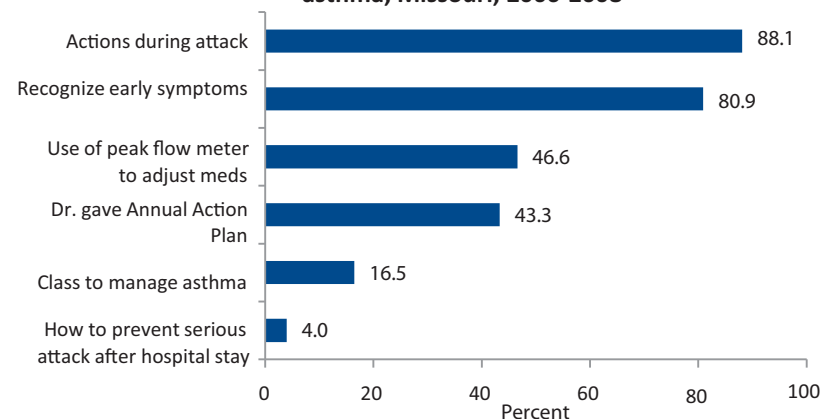
Figure 27. Inhaler use and education among adults with current asthma, Missouri, 2006-2008



Knowledge of Asthma/Management Plan—Children

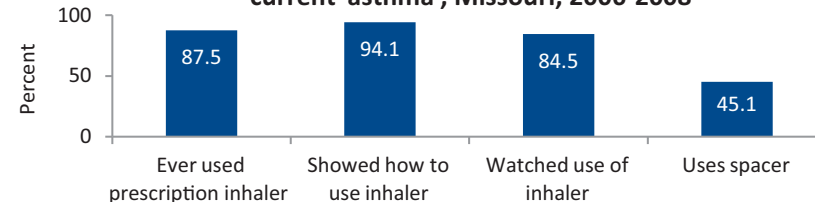
Educating children and their families about asthma is a major goal of the intervention component of the Missouri Asthma Prevention and Control Program. As shown in Figure 28, the majority of children with current asthma or their parent/care giver had received education on what to do during an asthma attack (88.1%) and on the early recognition of the signs and symptoms of an attack (80.9%). Although higher than adults, on average only 16.5 percent of Missouri children with current asthma have taken a course or class on how to manage their asthma. Of the children with a hospital stay in the past 12 months, only 4.0 percent of parents or children were talked to by a health professional about preventing a serious attack the last time the child was discharged from the hospital.

Figure 28. Asthma education among children with current asthma, Missouri, 2006-2008



Many children with current asthma have used a prescription inhaler, received inhaler education and have been observed using the inhaler but less than one-half use a spacer (Figure 29).

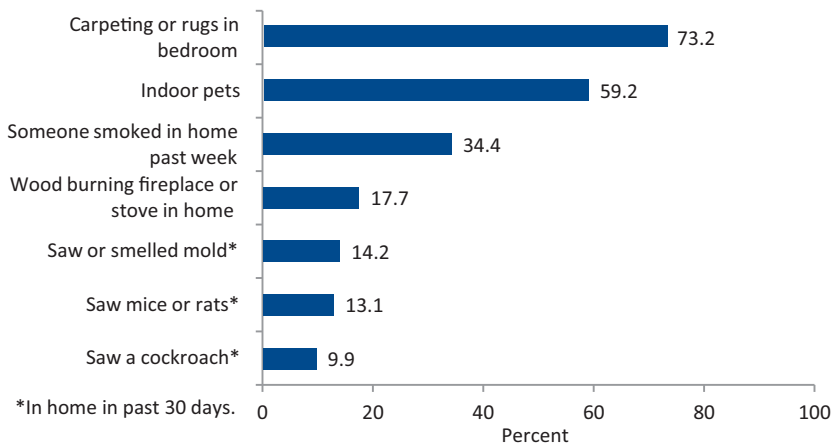
Figure 29. Inhaler use and education among children with current asthma, Missouri, 2006-2008



Environment—Adults

There are many irritants and allergens in the environment that can trigger an asthma attack or episode. Exposure to these agents may occur indoors or outdoors. Triggers vary between individuals but it is important for each person to identify and avoid their specific triggers, whenever possible. Common triggers include: dust mites, cockroach particles, animal and rodent dander, mold and tobacco smoke. Asthma may also be triggered by strenuous physical activity; weather conditions (e.g., very cold temperatures, thunderstorms or high humidity); smoke and particulates from burning wood, grass or other vegetation; some food and food additives; viral respiratory infections; stress and strong emotional states; and some medicines. Air pollutants such as industrial emissions, automobile exhaust and particulate matter often worsen pre-existing asthma. Many Missouri adults with current asthma are exposed to indoor triggers (Figure 30).

Figure 30. Selected indoor environmental triggers among adults with current asthma, Missouri, 2006-2008

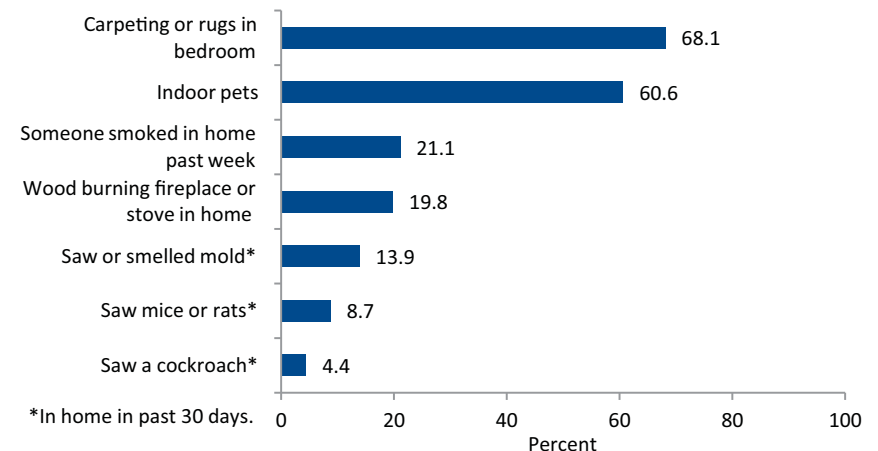


About one-third (37.8%) of adults with current asthma in Missouri have been advised by a health professional to change things in their home, school or work to improve their asthma. Some Missouri adults with current asthma take preventive steps to decrease the risk such as washing their sheets in hot water (40.4%), using mattress (24.8%) and pillow (21.3%) covers, and using an air purifier (29.9%) or dehumidifier (24.5%) regularly in the home.

Environment—Children

Similar to adults, many children are exposed to environmental irritants and allergens that increase symptoms and can cause asthma exacerbations. In the home, more than two of every three children with asthma (68.1%) have carpeting or rugs in the bedroom and more than one-half (60.6%) have indoor pets (Figure 31). Of the children with indoor pets, two of every three children (66.5%) allow the pet in the bedroom. Approximately one-fifth of children with current asthma had been exposed to someone smoking in the home in the week prior to the survey. If a child has asthma, people should never smoke near them, in the home, in the car, or wherever the child spends a lot of time. Some children with current asthma are exposed to mold, rodents and cockroaches in the home – all potential triggers of asthma or can make existing asthma worse.

Figure 31. Selected indoor environmental triggers among children with current asthma, Missouri, 2006-2008

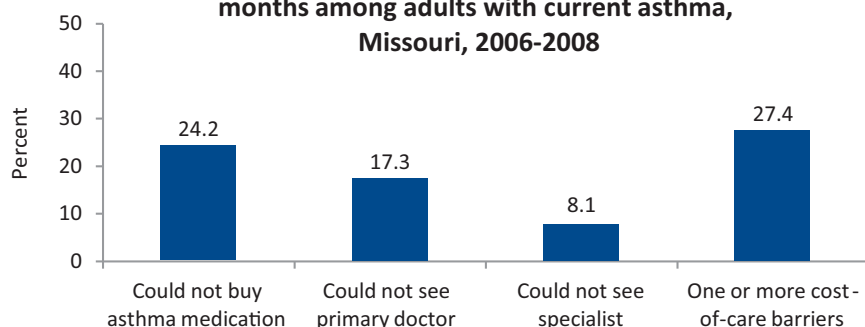


Almost one-half (49.7%) of parents of children with current asthma in Missouri have been advised by a health professional to change things in their home, school or work to improve their child's asthma. Some are taking preventive steps to decrease the risk of exacerbations in their child such as washing the child's sheets in hot water (39.5%), using mattress (27.1%) and pillow (27.0%) covers, and using an air purifier (25.0%) or dehumidifier (25.1%) regularly in the home.

Cost as a Barrier to Asthma Care—Adults

The majority of individuals with current or former asthma completing interviews for the ACBS from 2006-2008 were insured (88.2%). Yet out-of-pocket costs were a barrier for some adults needing primary health care, specialized care, and medication for their asthma. In Missouri, more than one-fourth (27.4%) of adults with current asthma could not obtain one or more needed health services for their asthma due to cost (Figure 32).

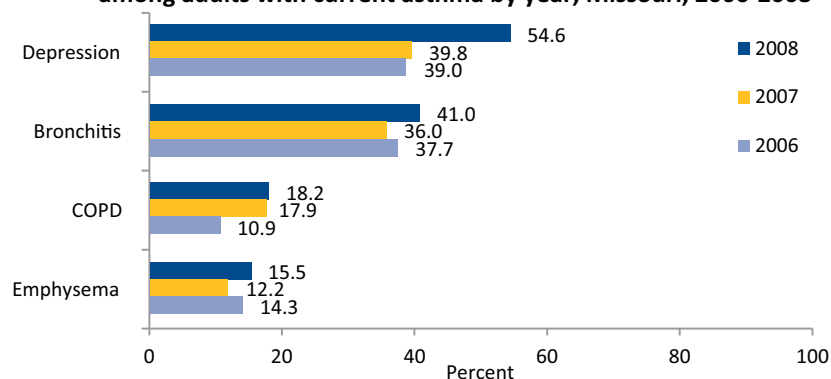
Figure 32. Prevalence of cost-of-care barriers in the past 12 months among adults with current asthma, Missouri, 2006-2008



Co-Morbid Conditions—Adults

People with asthma often have other health conditions that play a role in asthma control and require care. In 2008, more than one-half (54.6%) of adults with current asthma in Missouri reported being told by a doctor or other health professional that they were depressed (Figure 33).

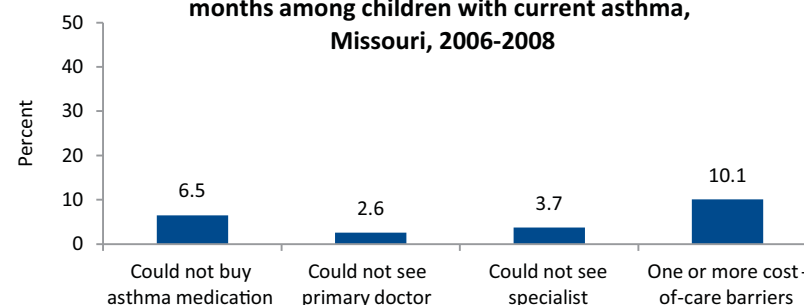
Figure 33. Prevalence of ever diagnosed co-morbid conditions among adults with current asthma by year, Missouri, 2006-2008



Cost as a Barrier to Asthma Care—Children

The majority of children with current or former asthma were insured at the time of the survey (85.0%). The majority were insured through the parent's employer (64.3%) followed by Medicaid/Medicare (28.4%). While most children had insurance coverage, some parent/care givers cited cost as a barrier to needed care or medications (Figure 34).

Figure 34. Prevalence of cost-of-care barriers in the past 12 months among children with current asthma, Missouri, 2006-2008

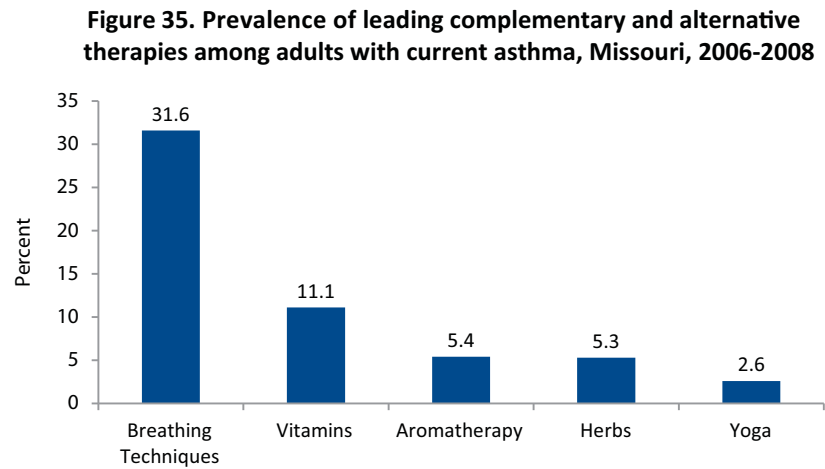


Co-Morbid Conditions—Children

Children with asthma often have other health conditions that play a role in asthma control and require care. Common co-morbidities in children include: gastroesophageal reflux disease (GERD), obesity, and rhinitis/sinusitis. The symptoms of GERD are common in both children and adults who have asthma. Reflux during sleep can contribute to night time asthma symptoms and awakenings. Obesity has been associated with asthma persistence and severity in both children and adults. Obesity itself causes alterations in pulmonary physiology that can lead to shortness of breath, but also increases the risk of asthma. In 2006-2008, 26.7 percent of children with current or former asthma were obese according to parent-reported child's height and weight. In children who have asthma and are treated with intranasal corticosteroids and antibiotics for rhinosinusitis, improvement in respiratory symptoms has been shown to be accompanied by decreases in inflammatory cells and mediators in the nose.

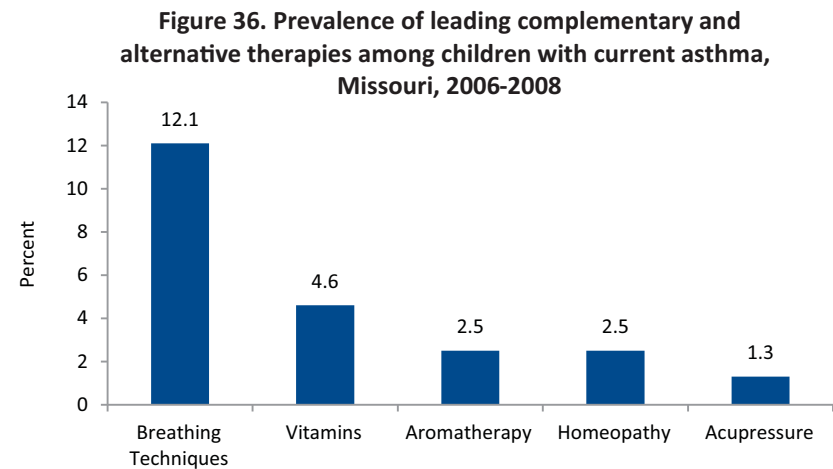
Complementary and Alternative Therapy—Adults

Sometimes adults use methods other than prescription medication to help treat or control their asthma. These methods are considered non-traditional and called complementary or alternative methods. The five leading complementary and alternative therapies used by adults with current asthma and included as part of the ACBS interview are shown in Figure 35.



Complementary and Alternative Therapy—Children

Sometimes complementary and alternative therapies are used in the hope of improving asthma control in children. The leading complementary and alternative therapies for children are shown in Figure 36. Other complementary and alternative therapies included herbs, yoga, naturopathy and self-care.



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¹Missouri Department of Health and Senior Services. 2010 Behavioral Risk Factor Surveillance System Data Report. Accessed April 16, 2012, from <http://www.health.mo.gov/data/brfss/2010datareport.pdf>.

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³National Heart Lung and Blood Institute. (2007). National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the diagnosis and management of asthma. Accessed April 16, 2012, from <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>.

⁴Centers for Disease Control and Prevention. Behavioral Risk Factor Surveillance System. Accessed April 16, 2012, from <http://www.cdc.gov/brfss>.

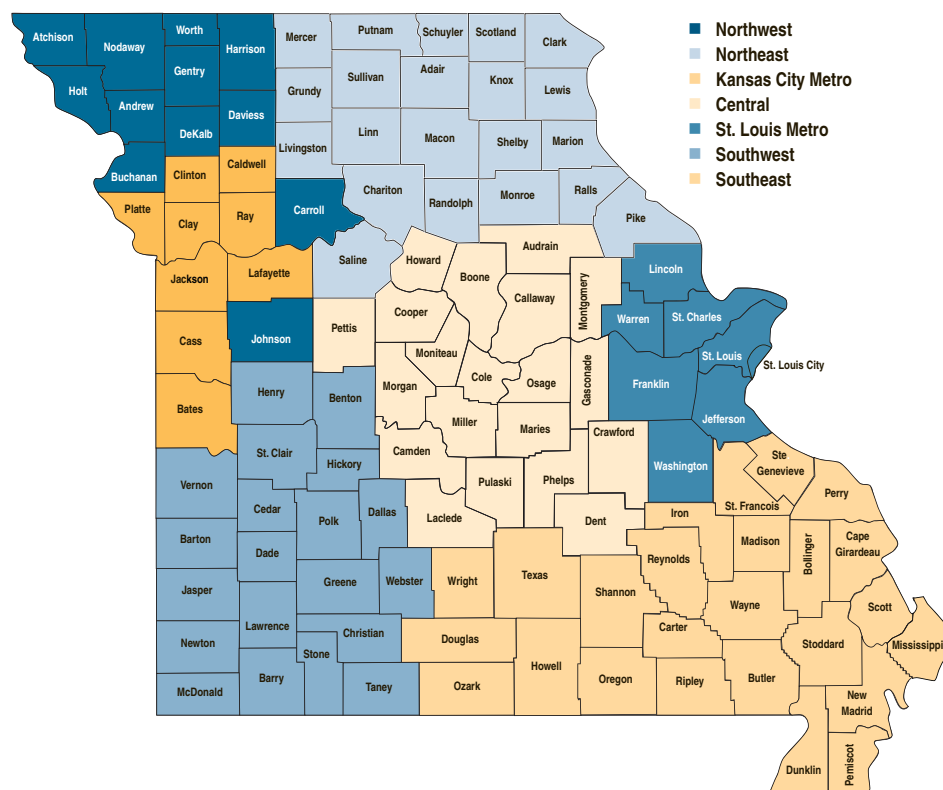
⁵Centers for Disease Control and Prevention. 2006-2008 Behavioral Risk Factor Surveillance System Asthma Call-Back Survey Summary Data Quality Report. Atlanta, GA: National Asthma Control Program. Accessed April 16, 2012, from <http://www.cdc.gov/brfss/acbs/2006/2006.htm>.

⁶Wasilevich, B., Nguyen T. & the Asthma Control Classification Workgroup. Measuring Asthma Control: Using the Asthma Call-Back Survey to Attribute Asthma Control Level based on EPR-3 Impairment Components Webinar. Atlanta, GA: Centers for Disease Control and Prevention.



Appendix—Regional Data for Missouri

Missouri is comprised of 114 counties and St. Louis City. The counties and St. Louis City are clustered into the following seven geographical BRFSS regions: Kansas City Metro, St. Louis Metro, Central, Southeast, Southwest, Northwest and Northeast. Although three years of the child ACBS study interview data were combined, the sample size was too small for the seven regional analysis so regions were combined into: Central-Northeast-Northwest, Kansas City Metro, Southeast-Southwest and St. Louis Metro.



Socio-demographic characteristics of Missouri adult ACBS respondents, 2006-2008

Characteristic	Unweighted Sample Size (Number)	Weighted Percent
Overall	1,004	100
Region		
Central	122	12.2
Kansas City Metro	181	18.0
Northeast	110	10.9
Northwest	133	13.3
Southeast	110	10.9
Southwest	132	13.2
St. Louis Metro	216	21.5
Gender		
Male	318	43.7
Female	686	56.3
Age Group		
18-39	197	43.5
40-49	166	17.4
50-64	378	24.1
65 and older	263	15.0
Race/Ethnicity		
White	810	82.5
African-American	95	7.2
Other	94	10.2
Unknown	5	0.1
Hispanic	13	1.3
Education		
Less than High School	158	15.3
High School	317	32.4
Post-High School	528	52.3
Unknown	1	0.0
Marital Status		
Never married	115	15.7
Married	498	58.9
Divorced, Widowed, Separated	364	20.3
Unmarried couple	25	5.0
Unknown	2	0.1

Socio-demographic characteristics of Missouri adult ACBS respondents, 2006-2008 cont.

Characteristic	Unweighted Sample Size (Number)	Weighted Percent
Household Income		
Less than \$15,000	200	12.4
\$15,000-24,999	212	17.5
\$25,000-34,999	126	12.2
\$35,000-49,999	138	14.7
\$50,000-74,999	119	15.1
\$75,000 and more	127	19.4
Unknown	82	8.8
Employment		
Employed	441	56.8
Out of Work	44	5.6
Unable to Work	202	12.7
Homemaker	66	6.6
Student	18	4.8
Retired	231	13.5
Unknown	2	0.1
Insurance Coverage		
Yes	885	84.1
No	117	15.4
Unknown	2	0.5

Socio-demographic characteristics of Missouri children in ACBS, 2006-2008

Characteristic	Unweighted Sample Size (Number)	Weighted Percent
Overall	262	100
Region		
Central-Northeast-Northwest	77	18.3
Kansas City Metro	59	21.5
Southeast-Southwest	62	24.8
St. Louis Metro	64	35.4
Gender		
Male	61	29.1
Female	201	70.9
Age Group		
0-4	34	18.0
5-11	102	38.3
12-17	125	43.1
Unknown	1	0.5
Race/Ethnicity		
White	217	87.1
African-American	30	9.3
Other	14	3.6
Unknown	1	0.1
Hispanic	5	1.5
Household Income		
Less than \$25,000	65	23.1
\$25,000-49,999	79	28.2
\$50,000 and more	102	42.8
Unknown	16	5.9
Insurance Coverage		
Yes	219	85.0
No	43	15.0



